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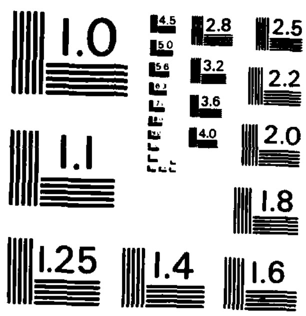

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UPTAKE OF HEAVY METALS FROM CONTAMINATED SOILS BY SALT-MARSH PLANTS

by

A.H.L. Huiskes and J. Nieuwenhuize

Delta Institute for Hydrobiological Research
Vierstraat 28, 4401 EA Yerseke, The Netherlands

contract number DAJA 45-83-C-0024

Second Periodic report
May 1983 - september 1983

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Salt marshes
Plant uptake

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Available data indicate that Spartina alterniflora grows more vigorously on soils with low salinity than on salt-free soils. No data on heavy metals uptake is yet available.

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1. Introduction

This second periodic report is intended to give the state of affairs of the contract research the authors are performing for the U.S. Army Corps of Engineers under number DAJA 45-83-C-0024.

In the first periodic report the objectives of the study, the experimental design, the materials and methods used and the set up of the experiment have been explained. As the present report has to be seen as a sequel to that report, these items will not be repeated in this report.

2. The harvest

Ninety days after the application of seawater to the containers, the waterlogged plants were harvested. Almost all plants of Spartina anglica flowered after ninety days. The plants growing in the "upland" situation, in a drained sediment, were harvested four weeks later, as the salinity levels in the containers of these plants were established four weeks after planting, like in the waterlogged containers. As in the waterlogged situation, most of the S. anglica plants flowered at harvesting, those of S. alterniflora did not.
Only the shoots of the plants were harvested. Plastic gloves and tools were used during the harvest. Fresh weight, number of tillers and total length of the shoot were measured. The results of these measurements are shown in figures 1, 2 and 3. After these measurements the shoots were thoroughly washed with demineralized water, dried with blotting paper and put in a polythene bag, rinsed with demineralized water. After that the bag was labeled and stored at -20^{o}C (-4^{o}F), awaiting further analysis.
From a number of containers the roots were harvested and also soil samples were taken.

3. Preliminiary results and discussion

Figure 1 shows the fresh weights of the shoots of both species. Clearly can be seen that under "upland" conditions there seems to be no difference in response to salinity. This phenomenon could be ascribed though to a leaching of the salt due to the watering of the pots. The soil analyses will give an answer

on this. In the waterlogged situation the salinity of the soil - and the water- influences clearly the growth of both species. Figure 1c shows a better growth of S. alterniflora under waterlogged conditions than under "upland conditions, although this difference is not significant.

In Figures 1a and 1b can also be seen that the individual plants of S. alterniflora are on average heavier than the plants of S. anglica. This difference is not due to the number of tillers per plant - S. anglica produces more tillers per individual than S. alterniflora (Figure 2) - but due to the fact that S. alterniflora plants produce longer and more robust tillers (Figure 3).

Growing the two species under "upland" conditions reduces the number of tillers per plant, but increases the total length of the shoot (Figure 3). Again the difference in salinity does not show a difference in response by the plants under upland conditions, but under waterlogged conditions a high salinity has an adverse effect on number of tillers per plant and total shoot length of both species, although these differences are not significant.
Comparing the Figures 1c, 2c and 3c with the Figures 1a and b, 2a and b and 3a and b respectively, the conclusion might be drawn, that the plants of S. alterniflora grow better on dredged material with low salinity than on WES-soil without salt in it. This will be discussed afterwards when the soil analyses have been completed.

6. Envisaged time schedule

Sept. '83 - Dec. '83	Chemical analyses of plants and soils.
Jan. '84	Third periodic report.
March '84	Start second experiment with S. alterniflora, Aster tripolium and Puccinellia maritima.
July '84	Harvest second experiment.
Sept. '84 - Dec. '84	Chemical analyses of plants and soils.
Jan. '85 - Febr. '85	Draft final and final technical report.

7. Acknowledgements

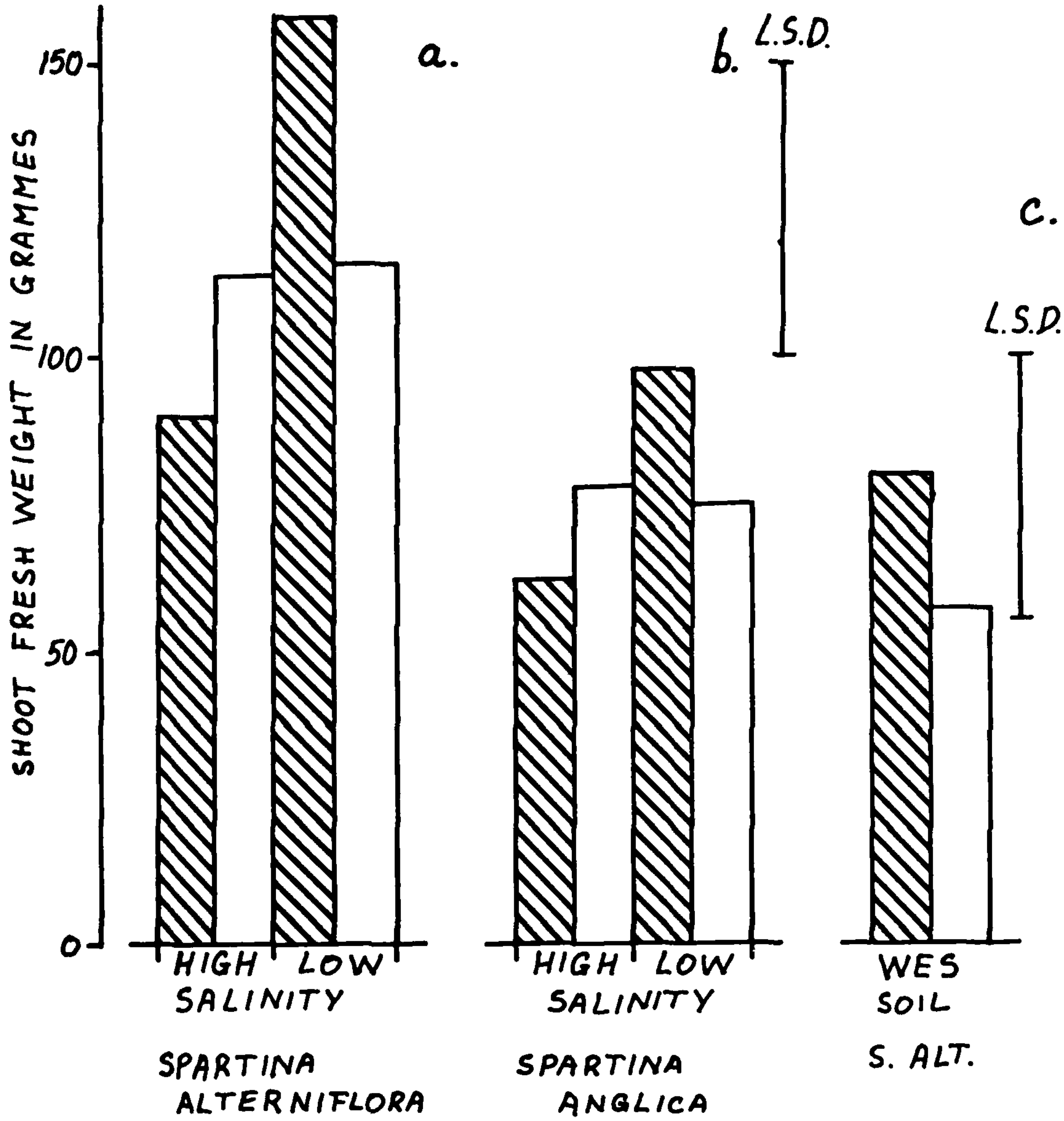
The authors are indebted to Mr. M.M. Markusse for his assistance in the set up, the maintenance, the watering and the harvesting of the experiment. They wish to thank also Mr. J. van Soelen for his help with the harvesting and Dr. J.W. Simmers for the comforting words during the week in which the experiment was planned to start, when all equipment - plants included - failed to arrive for a number of reasons.

Figure 1 The average fresh weight in grammes of shoots of *Spartina alterniflora* (a) and *Spartina anglica* (b) plants grown under waterlogged (hatched columns) and upland (open columns) conditions at two salinity levels. The vertical bar gives the least significant difference. For comparison, figure 1[c] shows the average fresh weight of shoots of *Spartina alterniflora* plants grown on a fertilized loamy soil.

Figure 2 The average number of tillers of shoots of *Spartina alterniflora* and *Spartina anglica* plants. For growth conditions see caption of Figure 1.

Figure 3 The average shoot height of *Spartina alterniflora* and *Spartina anglica* plants. For growth conditions see caption of figure 1.

FIG. 1.



SHOOT FRESH WEIGHT IN GRAMMES
150
100
50
0
a.
b.
L.S.D.
c.
L.S.D.
HIGH
LOW
SALINITY
SPARTINA
ALTERNIFLORA
HIGH
LOW
SALINITY
SPARTINA
ANGLICA
WES
SOIL
S. ALT.

FIG. 2.

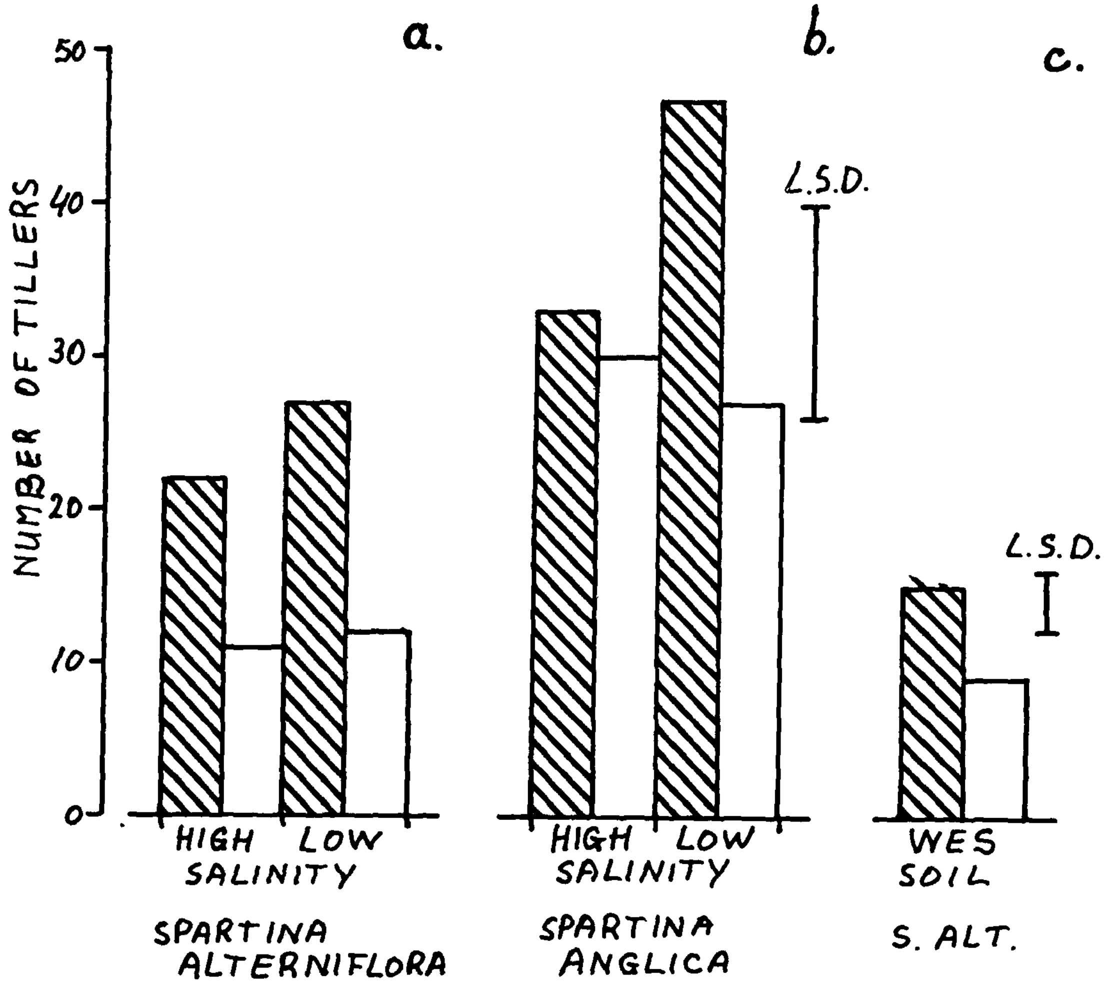
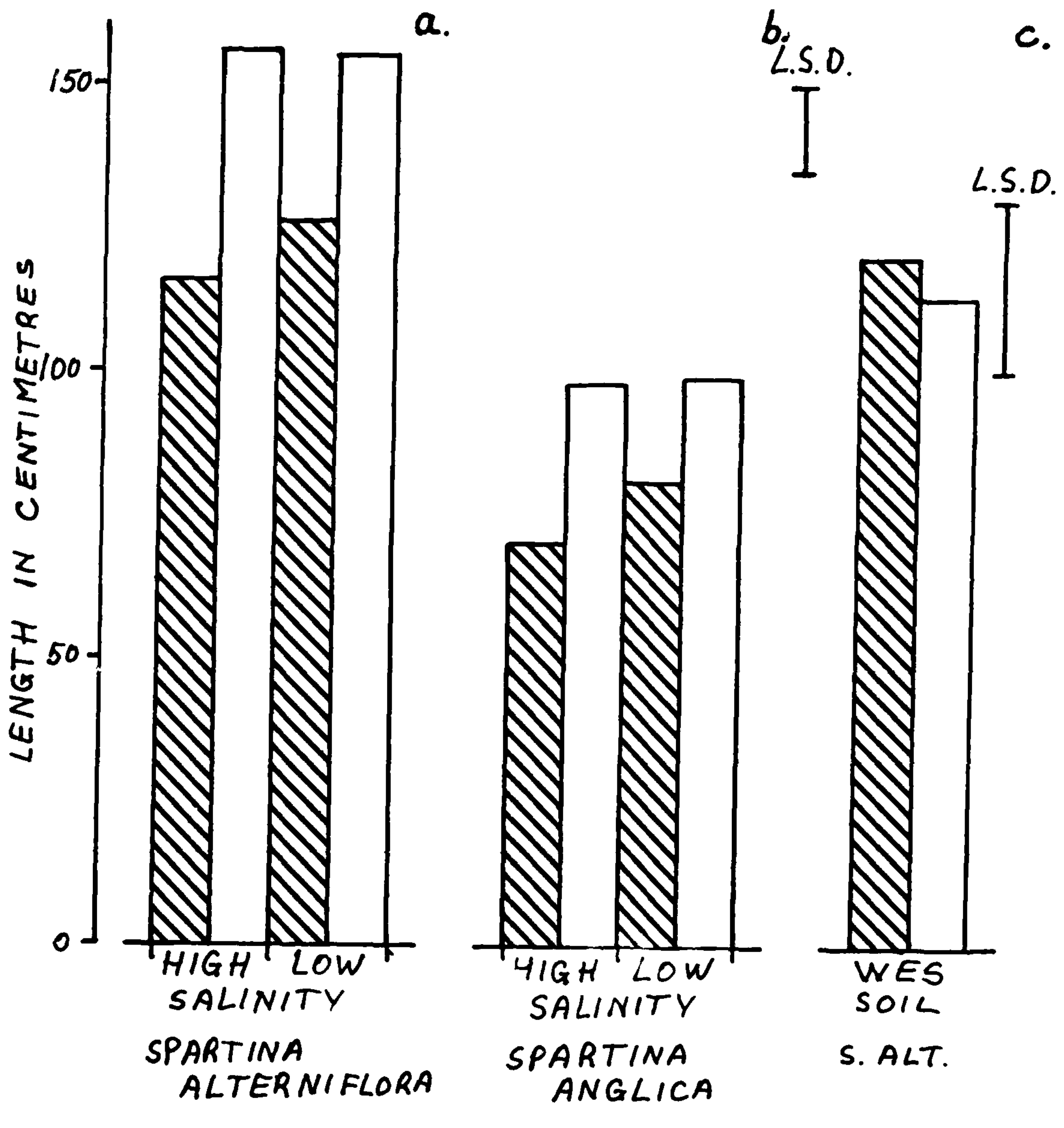

a.
b.
c.
NUMBER OF TILLERS
50
40
30
20
10
0
L.S.D.
L.S.D.
HIGH LOW
SALINITY
SPARTINA
ALTERNIFLORA
HIGH LOW
SALINITY
SPARTINA
ANGLICA
WES
SOIL
S. ALT.

FIG. 3.



a.
b.
c.
L.S.D.
L.S.D.
150
100
50
0
LENGTH IN CENTIMETRES
HIGH LOW
SALINITY
SPARTINA
ALTERNIFLORA
HIGH LOW
SALINITY
SPARTINA
ANGLICA
WES
SOIL
S. ALT.

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